EXHIBIT 21

Desktop HDD

Data Sheet

The Power of One

- Seagate brings over 30 years of trusted performance and reliability to the new Seagate® Desktop HDDs—now available in capacities up to 5TB.
- Double your capacity and drive down costs with up to 1.25TB-per-disk hard drive technology.
- SATA 6Gb/s interface optimizes burst performance
- Seagate AcuTrac™ servo technology delivers dependable performance.
- Free Seagate DiskWizard™ software allows you to install 3TB, 4TB and 5TB hard drives in Windows without UEFI BIOS.

Best-Fit Applications

- Desktop or all-in-one PCs
- Home servers
- Entry-level direct-attached storage devices (DAS)

Desktop HDD

Seagate

Specifications	5TB[1]	4TB[1]	3TB[1]	2TB[1]	1TB[1]	500GB[1]	320GB[1]	250GB[1]
Standard Model Numbers	ST5000DM000	ST4000DM000	ST3000DM001	ST2000DM001	ST1000DM003	ST500DM002[2]	ST320DM000[2]	ST250DM000[2]
Model Name	Desktop HDD	Desktop HDD	formerly Barracuda®	formerly Barracuda	formerly Barracuda	formerly Barracuda	formerly Barracuda	formerly Barracuda
Interface Options	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ	SATA 6Gb/s NCQ
Performance								
Cache, Multisegmented (MB)	128	64	64	64	64	16	16	16
SATA Transfer Rates Supported (Gb/s)	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5	6.0/3.0/1.5
Seek Average, Read (ms)	<8.5	<8.5	<8.5	<8.5	<8.5	<11	<11	<11
Seek Average, Write (ms)	<9.5	<9.5	<9.5	<9.5	<9.5	<12	<12	<12
Average Data Rate, Read/Write (MB/s)	146	146	156	156	156	125	125	125
Max Sustained Data Rate, OD Read (MB/s)	180	180	210	210	210	144	144	144
Configuration/Organization								
Heads/Disks	8/4	8/4	6/3	6/3	2/1	2/1	2/1	1/1
Bytes per Sector	4096	4096	4096	4096	4096	4096 or 512[2]	4096 or 512[2]	4096 or 512[2]
Voltage								
Voltage Tolerance, Inc. Noise (5V)	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Voltage Tolerance, Inc. Noise (12V)	±10%	±10%	+10%/–7.5%	+10%/–7.5%	+10%/–7.5%	+10%/–7.5%	+10%/–7.5%	+10%/–7.5%
Reliability/Data Integrity								
Contact Start/Stop Cycles	—	—	—	—	—	50,000	50,000	50,000
Load/Unload Cycles	300,000	300,000	300,000	300,000	300,000	—	—	—
Nonrecoverable Read Errors per Bits Read, Max	1 per 10E14	1 per 10E14	1 per 10E14	1 per 10E14	1 per 10E14	1 per 10E14	1 per 10E14	1 per 10E14
Workload Rate Limit (TB/year)	55	55	55	55	55	55	55	55
Power-On Hours	2400	2400	2400	2400	2400	2400	2400	2400
Limited Warranty (years)[3]	2	2	2	2	2	2	2	2
Power Management								
Startup Power (A)	2.0	2.0	2.5	2.5	2.0	2.0	2.0	2.0
Operating Mode, Typical (W)	7.5	7.5	8.0	8.0	5.90	6.19	6.19	6.19
Idle Average (W)	5.0	5.0	5.8	5.8	4.0	4.60	4.60	4.60
Standby Mode (W)	0.75	0.75	0.75	0.75	0.63	0.79	0.79	0.79
Sleep Mode (W)	0.75	0.75	0.75	0.75	0.63	0.79	0.79	0.79
Environmental								
Temperature								
Operating (ambient min °C)	0	0	0	0	0	0	0	0
Operating (drive case max °C)	60	60	60	60	60	60	60	60
Nonoperating (ambient °C)	–40 to 70	–40 to 70	–40 to 70	–40 to 70	–40 to 70	–40 to 70	–40 to 70	–40 to 70
Halogen Free	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RoHS Compliance	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Physical								
Height (mm/in)	26.11/1.028	26.11/1.028	26.11/1.028	26.11/1.028	20.17/0.7825	19.98/0.787	19.98/0.787	19.98/0.787
Width (mm/in)	101.6/4.0	101.6/4.0	101.6/4.0	101.6/4.0	101.6/4.0	101.6/4.0	101.6/4.0	101.6/4.0
Depth (mm/in)	146.99/5.787	146.99/5.787	146.99/5.787	146.99/5.787	146.99/5.787	146.99/5.787	146.99/5.787	146.99/5.787
Weight (g/lb)	610/1.345	610/1.345	626/1.38	626/1.38	400/0.88	415/0.92	415/0.92	415/0.92
Carton Unit Quantity	20	20	20	20	25	25	25	25
Cartons per Pallet	40	40	40	40	40	40	40	40
Cartons per Layer	8	8	8	8	8	8	8	8
Special Features								
Seagate AcuTrac™ Technology	Yes	Yes	Yes	Yes	Yes	No	No	No

1 One gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes when referring to drive capacity.
2 Seagate ships this drive in both 4K- and 512-byte sectors. SmartAlign technology is included on 4K sector drives. Both drives are functionally and physically equivalent.
3 Extended warranty products available. Consult your distributor for details.

ADVANCED AF FORMAT

www.seagate.com

AMERICAS Seagate Technology LLC 10200 South De Anza Boulevard, Cupertino, California 95014, United States, 408-658-1000
ASIA/PACIFIC Seagate Singapore International Headquarters Pte. Ltd. 7000 Ang Mo Kio Avenue 5, Singapore 569877, 65-6485-3888
EUROPE, MIDDLE EAST AND AFRICA Seagate Technology SAS 16–18, rue du Dôme, 92100 Boulogne-Billancourt, France, 33 1-4186 10 00

EXHIBIT 22

APRIL 2013

Quick-Reference Guide

LAPTOP, DESKTOP AND VIDEO STORAGE DRIVES

Segment		Family Platform	Model Number	Part Number	FF (in)	Capacity[1]	Interface		Cache (MB)	Warranty, Limited (yrs)	Options
LAPTOP	Performance	Laptop SSHD	ST1000LM014	1EJ164	2.5	1TB	SATA	6Gb/s	64	3	Solid state hybrid drive
		Laptop Thin SSHD	ST500LM000	1EJ162	2.5	500GB	SATA	6Gb/s	64	3	Solid state hybrid drive
	Mainstream	Momentus®	ST9750420AS[4]	9RT14G	2.5	750GB	SATA	3Gb/s	16	2	
			ST9500423AS[4]	9RT143	2.5	500GB	SATA	3Gb/s	16	2	
			ST9500325AS	9HH134	2.5	500GB	SATA	3Gb/s	8	2	
			ST9500325ASG	9KAG34	2.5	500GB	SATA	3Gb/s	8	2	G-Force Protection™
			ST9500327AS	9PR134	2.5	500GB	SATA	3Gb/s	8	2	Encryption
			ST9320423AS	9HV14E	2.5	320GB	SATA	3Gb/s	16	2	
			ST320LT023[3,4]	1AF142	2.5	320GB	SATA	3Gb/s	16	2	
			ST9320325AS	9HH13E	2.5	320GB	SATA	3Gb/s	8	2	
			ST9250410AS	9HV142	2.5	250GB	SATA	3Gb/s	16	2	
			ST9250315AS	9HH132	2.5	250GB	SATA	3Gb/s	8	2	
	Thin (7mm z-height)	Momentus Thin	ST500LT025	1A5142	2.5	500GB	SATA	3GB/s	16	2	Encryption
			ST500LT015	9WU142	2.5	500GB	SATA	3GB/s	16	2	Encryption/FIPS Validated[2]
			ST500LT012[4]	9WS142	2.5	500GB	SATA	3GB/s	16	2	
			ST320LT007[4]	9ZV142	2.5	320GB	SATA	3Gb/s	16	2	
			ST320LT014[4]	9YK142	2.5	320GB	SATA	3Gb/s	16	2	Encryption
			ST320LT009[2,4]	9WC142	2.5	320GB	SATA	3Gb/s	16	2	Encryption/FIPS Validated[2]
			ST320LT020[4]	9YG142	2.5	320GB	SATA	3Gb/s	16	2	
			ST320LT012	9WS14C	2.5	320GB	SATA	3Gb/s	16	2	
			ST250LT007[4]	9ZV14C	2.5	250GB	SATA	3Gb/s	16	2	
			ST250LT003[4]	9YG14C	2.5	250GB	SATA	3Gb/s	16	2	
			ST250LT012	9WS141	2.5	250GB	SATA	3Gb/s	16	2	

CONTINUED > Desktop and Video Storage pg 2

APRIL 2013

Quick-Reference Guide

LAPTOP, DESKTOP AND VIDEO STORAGE DRIVES

Segment		Family Platform	Model Number	Part Number	FF (in)	Capacity[1]	Interface		Cache (MB)	Warranty, Limited (yrs)	Options
DESKTOP	Performance	Desktop SSHD	ST2000DX001	1CM164	3.5	2TB	SATA	6Gb/s	64	3	Solid state hybrid drive
			ST1000DX001	1CM162	3.5	1TB	SATA	6Gb/s	64	3	Solid state hybrid drive
	Mainstream	Desktop HDD	ST4000DM000	1F2168	3.5	4TB	SATA	6G/s	64	2	
			ST3000DM001[6]	9YN166	3.5	3TB	SATA	6Gb/s	64	2	
			ST2000DM001[6]	9YN164	3.5	2TB	SATA	6Gb/s	64	2	
			ST1000DM003[6]	9YN162	3.5	1TB	SATA	6Gb/s	64	2	
			ST500DM002[5,6]	1BC142	3.5	500GB	SATA	6Gb/s	16	2	
			ST320DM000[5,6]	1BD14C	3.5	320GB	SATA	6Gb/s	16	2	
			ST250DM000[5,6]	1BD141	3.5	250GB	SATA	6Gb/s	16	2	
VIDEO STORAGE	Surveillance	SV35 Series™	ST3000VX000	9YW166	3.5	3TB	SATA	6Gb/s	64	3	
			ST2000VX000	9YW164	3.5	2TB	SATA	6Gb/s	64	3	
			ST1000VX000	9YW162	3.5	1TB	SATA	6Gb/s	64	3	
	DVR	Video 2.5 HDD	ST500VT000	1BS142	2.5	500GB	SATA	3Gb/s	16	3	
			ST320VT000	1BS14C	2.5	320GB	SATA	3Gb/s	16	3	
			ST250VT000	IBS141	2.5	250GB	SATA	3Gb/s	16	3	
		Pipeline HD®	ST2000VM003	1CT164	3.5	2TB	SATA	3Gb/s	64	3	
			ST1000VM002	9ZL162	3.5	1TB	SATA	6Gb/s	64	3	
			ST3500312CS	9GW132	3.5	500GB	SATA	3Gb/s	8	3	
			ST3320311CS	9GW13C	3.5	320GB	SATA	3Gb/s	8	3	
			ST3250312CS	9GW131	3.5	250GB	SATA	3Gb/s	8	3	

1 One gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes when referring to hard drive capacity.
2 See FIPS 140-2 Level 2 Certificate at http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401vend.htm.
3 7mm z-height expanded to 9.5mm enables compatibility with standard laptop chassis.
4 Advanced Format 4K sector drive with SmartAlign™ technology resolves misalignment conditions.
5 Seagate ships this drive in both 4K- and 512-byte sectors. SmartAlign technology is included on 4K sector drives. Both drives are functionally and physically equivalent.
6 Formerly Barracuda® drive

New Seagate Model Number Key

Desktop, laptop and video storage

ST 500 DX 001

BRAND	CAPACITY	SEGMENT	ATTRIBUTES
2 letters	*2 to 4 digits*	*2 letters*	*3 digits, non-intelligent*
ST= Seagate MX= Maxtor	80 = 80GB 500 = 500GB 1500 = 1500GB Capacities >9999GB: 10 = 10TB 15 = 15TB	DX = Desktop Premium DM = Mainstream DL = Entry Level LX = Laptop Premium LM = Laptop Mainstream LT = Laptop Thin VX = Surveillance VM = DVR VT = DVR Thin	Varies for: Z-heights Form Factor RPM Cache Interface SED, FIPS Drop Sensor Interface Speed

View a brief training presentation on how our model number format has changed at www.brainshark.com/seagate/ModelNumber

Seagate Partner Program

Seagate Partner Program Members
Visit the Sales Tools section to access the latest product roadmap, end-of-life schedule and product information. http://spp.seagate.com

Distributors
http://direct.seagate.com

EMEA SPP Support
00-800-6890-8282

US Sales Support
1-800-SEAGATE or 1-405-324-4700

Visit www.seagate.com for more information or call 1-800-SEAGATE (1-800-732-4283)

EXHIBIT 23

Plaintiffs' Exhibit (Scarlett Decl)	Bates Number	Where Previously Cited or Submitted by Plaintiffs	Discussed in Rodewald Decl. Paragraph	Type of Document
13	FED_SEAG0076615	Scarlett I[1], Ex. 72	¶¶ 41, 42	This document contains reviews for external products—*for which plaintiffs do not seek class certification*. The comment they quote is for an external drive.
14	FED_SEAG0093489	Scarlett I, Ex. 72	¶¶ 41, 42	This document contains reviews for external products—*for which plaintiffs do not seek class certification*. The comment they quote is for an external drive.
22	FED_SEAG0056563	Hospodor II[2]	¶ 30	Document concerning Feb-May 2013
23	FED_SEAG0009670	Hospodor I[3]	¶ 19	2012 document regarding 2012 or earlier drives
24	FED_SEAG0055127	Hospodor II	¶ 19	2012 document regarding 2012 or earlier drives
25	FED_SEAG0055922	Hospodor II	¶ 19	2012 document regarding 2012 or earlier drives
26	FED_SEAG0063104	Hospodor II	¶ 19	2012 document regarding 2012 or earlier drives
27	FED_SEAG0060976	Reply Berman Decl. Ex 54[4]	¶ 19	2012 document regarding 2012 or earlier drives
28	FED_SEAG0006071	Hospodor II	¶ 22	Backblaze's commercial, data-center use of 2012 drives
29	FED_SEAG0067917	Hospodor II	¶ 19	2012 document regarding 2012 or earlier drives

[1] "Scarlett I" refers to ECF 175-5, the Declaration of Shana E. Scarlett in Support of Plaintiffs' Second Supplemental Brief in Further Support of Class Certification.

[2] "Hospodor II" refers to ECF 158-7, the "Rebuttal" Declaration of Andrew Hospodor in Support of Plaintiffs' Motion for Class Certification.

[3] "Hospodor I" refers to ECF 133-5, the Declaration of Andrew Hospodor in Support of Plaintiffs' Motion for Class Certification.

[4] The "Reply Berman Decl." refers to ECF 158-4, the Declaration of Steve W. Berman in Further Support of Plaintiffs' Motion for Class Certification.

Plaintiffs' Exhibit (Scarlett Decl)	Bates Number	Where Previously Cited or Submitted by Plaintiffs	Discussed in Rodewald Decl. Paragraph	Type of Document
30	FED_SEAG0067889	Not cited or submitted before	¶ 19	2012 document regarding 2012 or earlier drives
31	FED_SEAG0055041	Hospodor I	¶ 19	2012 document regarding 2012 or earlier drives
32	FED_SEAG0055831	Hospodor I	¶ 19	2012 document regarding 2012 or earlier drives
33	FED_SEAG0059618	Hospodor II	¶ 19	2012 document regarding 2012 or earlier drives
34	FED_SEAG0026751	Hospodor I	¶ 19	2012 document regarding 2012 or earlier drives
35	FED_SEAG0057277	Hospodor I	¶ 29	document concerning the Grenada **BP2** Drive, which Plaintiffs specifically exclude from their class definition.
36	FED_SEAG72642	Supp Berman Decl.[5] Ex 59	¶ 23	commercial, data-center use of 2011 drives
37	FED_SEAG0006442	Supp Berman Decl. Ex 21	¶ 19	2012 document regarding 2012 or earlier drives
38	FED_SEAG0073676	Supp Berman Decl. Ex 61	¶ 24	commercial, data-center use of 2012 or earlier drives
39	FED_SEAG0072348	Supp Berman Decl. Ex 62	¶ 25	commercial, data-center use of 2011-2012 drives
40	FED_SEAG0071790	Supp Berman Decl. Ex 63	¶ 26	commercial, data-center use of 2012 or early vintage 2013 drives
41	FED_SEAG0071982	Supp Berman Decl. Ex 66	¶ 26	commercial, data-center use of 2012 or early vintage 2013 drives
42	Fed_SEAG0071996	Supp Berman Decl. Ex 67	¶ 26	commercial, data-center use of 2012 or early vintage 2013 drives
43	FED_SEAG0057214	Hospodor I	¶ 28	document concerning Apple

[5] The "Supp Berman Decl." refers to ECF 167-4, the Declaration of Steve Burman in Support of Plaintiffs' Supplemental Brief in Further Support of Class Certification.

Plaintiffs' Exhibit (Scarlett Decl)	Bates Number	Where Previously Cited or Submitted by Plaintiffs	Discussed in Rodewald Decl. Paragraph	Type of Document
44	FED_SEAG0002673	Berman Decl.[6] Ex 23	¶ 28	document concerning Apple
45	FED_SEAG0055784	Hospodor I	¶ 28	document concerning Apple
46	FED_SEAG0024743	Berman Decl. Ex 24	¶ 19	2012 document regarding 2012 or earlier drives
47		Hospodor I	¶ 22	Backblaze's commercial, data-center use of 2012 drives
48	FED_SEAG0025567	Hospodor I	¶ 22	Backblaze's commercial, data-center use of 2012 drives
49		Hospodor I	¶ 22	Backblaze's commercial, data-center use of 2012 drives
50	FED_SEAG0010073	Hospodor I	¶ 22	Backblaze's commercial, data-center use of 2012 drives
51	FED_SEAG0025642	Hospodor I	¶ 22	Backblaze's commercial, data-center use of 2012 drives
52		Hospodor I	¶ 20	document concerning Khurshudov's irrelevant study
53	FED_SEAG0090915	Scarlett I, Ex. 72	¶¶ 43 - 45	The chart contains data on 419 different products (419 different model numbers), only 22 of which are at issue in this Action, and only 112 rows relating to the products at issue. Plaintiffs quote a comment about a product not at issue in this litigation.

[6] The "Berman Decl." refers to ECF 136, the Declaration of Steve Burman in Support of Plaintiffs' Motion for Class Certification.

Plaintiffs' Exhibit (Scarlett Decl)	Bates Number	Where Previously Cited or Submitted by Plaintiffs	Discussed in Rodewald Decl. Paragraph	Type of Document
54	FED_SEAG0090943	Scarlett I, Ex. 72	¶¶ 43 - 45	This document contains entries relating to numerous products not at issue; it does not contain any rows relating to model numbers or sizes, so one cannot tell whether any particular entries relate to drives at issue. Plaintiffs quote one comment. There is no evidence this comment relates to the ST3000DM001, or to internal drives for which Plaintiffs seek class cert.
63		Not cited or submitted before	¶ 31	Summary chart created by plaintiffs - all but two cited documents relate to purported AFRs of 2012 drives, and only two documents relate to purported AFRs of 2013 drives
64	FED_SEAG0072362	Supp Berman Decl. Ex 60	¶ 27	commercial, data-center use of 2012 drives

EXHIBIT 24

EXHIBIT 14
[UNREDACTED VERSION OF DOCUMENT SOUGHT TO BE SEALED]

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

No. 5:16-cv-00523-RMW

IN RE SEAGATE TECHNOLOGY, LLC

LITIGATION

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE CITY AND COUNTY OF SAN FRANCISCO

Case No. CGC-15-547787

TIM POZAR and SCOTT NALICK,
Individually and on Behalf of All Others
Similarly situated,

Plaintiffs,

vs.

SEAGATE TECHNOLOGY LLC and DOES
1-50,

Defendants.

VIDEOTAPED DEPOSITION OF ANDREI KHURSHUDOV
September 8, 2017

Q (BY MR. STROUT) But going back to my question, to the left of the dotted line it says B is greater than 1; is that right?

A It's anything that is -- that starts as a straight line but then tilts below it, becomes beta less than 1. If it starts as a straight line and tilts upward, then it's beta more than 1. So -- so each of this curve has its own straight line. I just didn't draw --

Q Right, I understand.

MR. SHARMA: I think he's testifying that the beta is -- the beta depicted here isn't a straight line.

THE REPORTER: Is or isn't?

MR. SHARMA: Is not.

Q (BY MR. STROUT) But just -- my question, it's very simple -- I understand everything you said, but just to the left of the dotted line it says B is greater than 1, correct?

A Yes.

Q All right. Thank you.

A And frankly, again, to avoid over-interpretation of this --

Q Uh-huh.

A -- somewhere about hour and a half ago I

mentioned that when the production starts, the process is not as stable. It -- it becomes more stable later.

The second thing that needs to be mentioned for that part, that the production volumes during that time are very low, which means whatever happens in the first -- we usually I think use two quarters of -- of waiting before we start making judgments about what's going on, because the first two quarters is -- you might be going from hundreds of units per day to tens of thousands of units per day, and even that is a low volume.

So, in other words, the Grenada here -- and this is the reason why I wrote at the bottom, we should wait until we could make a conclusion about Grenada, is because if I can count it correctly, it's four -- no more than five months old, which means it's under five -- under two quarters, which means we will not make judgment. And if you -- about this until we see more data.

And if you -- if you want to do a mental sort of experiment, just close a page like this, after -- say after 10.

Q Okay. I'm not quite sure how we're going to get this on the record, but for the record --

A Make projections for other curves, you probably will be wrong. Things change over time. For example, blue one crosses the pink one after a couple of years. While initially it was below, it becomes higher.

So my point is that that's why a lot of data has to be collected before, you know, statistically significant statements are made. This is why I was careful about Grenada specifically on this page.

Q Okay. Turn to Page 1857, please.

A I'm already on it.

Q Oh. Well, 1859 is what I meant.

A Okay.

Q All right. So the first bulletin on 1859 says, "According to the above chart, higher workload stress could be used as an explanation to the fact that some product families show constant or increasing failure rate over time," and in parentheses, "signatures of potential wearout."

Is that correct?

A Yes, that's correct.

Q And underneath that it says, "Less than 50 percent of high workload products," parentheses, stress -- "stress level 4 and 5, show failure rate

workload are exposed to workloads maybe 10 times higher than we even anticipated, so just incredibly high workloads. And this is what this is referring to.

Essentially, as we as a company anticipated us moving more and more -- 2012 is just maybe beginning of cloud storage. Since then a lot more sales go into cloud storage. So this was a sort of a warning that a much higher workload stress environment is just behind the corner, and it might change our perception unless we have, you know, analysis, perception of real stress in the field.

Q Underneath that you wrote, "Considering that we observe beta less than 1 in most of our internal," and in parentheses RDT, ORT, end parentheses, "tests, one could conclude that these relatively short tests do not predict well the long-term product reliability behavior."

Did I read that correctly?

A Yes, you read it correctly.

MS. MCLEAN: Actually, you left out a word. "Do not necessarily predict well."

Q (BY MR. STROUT) "Do not necessarily predict well the long-term product reliability behavior."

A Correct.

Q Okay. And you continue on this page, the very last bullet point says, "Longer-term reliability tests, about one year, might need to be introduced to gain more confidence in reliability projections."

Is that right?

A Correct.

Q Okay. So how long -- do you know how long these reliability tests, RDT, ORT tests, are run for at Seagate?

MS. MCLEAN: Objection, lacks foundation.

A Yeah, I -- it's been a while so I'm forgetting things, but I'm pretty sure that for the enterprise class of products, for a long time now Seagate has longer tests than -- than RDT. RDT is six weeks, but there are now tests that run for months and months.

And again, that's -- there is one other thing you need to understand, that it's not just the time of the test. There are such things as acceleration factors in the test. For example, if test is ran under twice as high workload as we expect, we can assume that it's a longer time test and, you know, we actually measure the same. Another known accelerator is temperature.

So -- so equivalent time of this test is not six times. At the time an RDT test might be -- I don't remember, but it might be a year.

So what I'm talking about here is making it even longer, and I know there are longer tests now used for, you know, mission critical products and enterprise class products -- enterprise class products.

Q (BY MR. STROUT) What about for desktop class products, have longer term reliability tests been implemented for those?

MS. MCLEAN: Objection, lacks foundation.

A Can you give me a second? I cannot remember this report. Let me look at it.

Q (BY MR. STROUT) Sure, take your time.

A What does it say.

Yeah, I think -- I think it's what I -- I remember. The thing is for the -- this client space, for desktops and mobile drives, this -- this study actually didn't show any even hints of wearout. The beta is always below 1. So the conclusion would be -- and this is again part of this study -- it's a low workload environment, and drives behave exactly how we expect. It's our mission critical products that might be affected. Look at them. This is the

direction of this -- of this summary, of this sort of work.

But so it -- from what I see here, we see the same thing in the internal tests and external tests, beta is less than 1, which means that the stress applied, you know, in Seagate tests is sufficient for this environment. So I don't think there's any recommendation to reconsider anything for client space. Desktop, notebook, external storage, all look like expected.

Q Okay. Well, please turn back to 1857, please, 1857.

A 57, yes.

Q And here the beta is increasing with each generation; is that correct?

A It looks like it, yes.

Q Well, it says that, doesn't it?

A It says that, yeah.

Q And these are desktop class drives, correct?

A Correct.

Q Okay. So do you know if longer term reliability tests were ever implemented for desktop class drives at Seagate?

A I don't know. I don't know. Based on

STATE OF COLORADO)

) ss. REPORTER'S CERTIFICATE

COUNTY OF DENVER)

I, Pamela J. Hansen, do hereby certify that I am a Registered Professional Reporter and Notary Public within the State of Colorado; that previous to the commencement of the examination, the deponent was duly sworn to testify to the truth.

I further certify that this deposition was taken in shorthand by me at the time and place herein set forth, that it was thereafter reduced to typewritten form, and that the foregoing constitutes a true and correct transcript.

I further certify that I am not related to, employed by, nor of counsel for any of the parties or attorneys herein, nor otherwise interested in the result of the within action.

In witness whereof, I have affixed my signature and seal this 21st day of September, 2017.

My commission expires September 3, 2018.

_____

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Denver, Colorado 80202

EXHIBIT 25

REDACTED VERSION OF DOCUMENT SOUGHT TO BE SEALED

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Attorneys for Defendant,
SEAGATE TECHNOLOGY LLC

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA, SAN FRANCISCO DIVISION

IN RE SEAGATE TECHNOLOGY LLC LITIGATION CONSOLIDATED ACTION	Case No. 3:16-cv-00523-JCS **DECLARATION OF DONALD ADAMS, PE IN SUPPORT OF SEAGATE'S OPPOSITION TO PLAINTIFFS' MOTION FOR CLASS CERTIFICATION** **Date:** March 30, 2018 **Time:** 9:30 a.m. **Place:** Courtroom G **Judge:** Hon. Joseph C. Spero Second Consolidated Amended Complaint filed: July 11, 2016

UNREDACTED VERSION OF DOCUMENT SOUGHT TO BE SEALED

40 year-olds. Similarly, the AFR for drives manufactured in 2011 vs. those manufactured in 2012, does not tell you whether drives used for 6 months have a higher or lower chance of failing *compared to drives used for 2 years*. That Hospodor thinks that his sequence of three AFRs (from three different test populations of drives all tested to the same age) can be used to determine whether Beta was greater than 1 further demonstrates Hospodor's fundamental misunderstanding of accepted reliability analysis methodologies (in particular, the Weibull distribution and the significance of the Beta parameter). It is simply not possible to use the sequence of AFRs Hospodor cites to reach his stated conclusion that Beta was greater than 1 or that the drives were 'wearing out prematurely.'

74. Hospodor goes on to say in Paragraph 91 that Beta or the shape parameter is the more important of the two primary parameters in the Weibull distribution. This is not correct, as explained in Paragraph 37 above.

2. Hospodor's Reliance on Khurshudov Is Misplaced

75. Beginning in paragraph 96 through 111, Hospodor introduces and discusses former Seagate employee Andrei Khurshudov's ("Khurshudov's") report on "Product Failure Rate Trends and the Role of Workload Stress" from about June of 2012 at which time he worked for Seagate. First, Hospodor simply ignores the fact that the Khurshudov report's conclusions do not apply to consumer, desktop drives like Grenada. In fact, in his deposition, Khurshudov explained that for desktop drives used in consumer applications (like Grenada), ***his report showed that those drives always behaved as expected, with Beta less than 1***. (Ex. 14 [Khurshudov Depo.] 126:23-129:10 ("The thing is for the -- this client space, ***for desktops and mobile drives***, this ***-- this study actually didn't show any even hints of wearout. The beta is always below 1***. So the conclusion would be -- and this is again part of this study -- ***it's a low workload environment, and drives behave exactly how we expect***. It's our mission critical products that might be affected.") Hospodor simply ignores what Khurshudov said about the conclusions of his own report, and then misapplies the report—to reach the opposite conclusion from what the report actually showed (which was Beta was less than 1 on consumer, desktop drives).

76. Second, there are several flaws in the report that Hospodor incorrectly endorses. These are:

a. Hospodor endorses the statement shown in the slide in his Figure 11 that wear out phenomenon (where Beta >1) is highly undesirable. This idea is naive. "Wear out" is unavoidable; everything eventually wears out (or dies). The key to a successful product is that its characteristic life is long enough to meet service life expectations.

b. The data is based on returns, not failures. Returns include failures and non-failures, and non-failures can be a large fraction of the total. For example, another document by Khurshudov shows that over 75% of returned products can have no trouble found, and a large proportion may never have even been used. (Ex. 15 [FED_SEAG0002320] at 2327; Almgren Decl., ¶ 25; Ex. 14 [Khurshudov Depo.] at 36:25-39:14.) Furthermore some failures may not be returned. Drawing conclusions about failure rates from return rates is unreliable.

c. In Paragraph 100 Hospodor refers to the plot taken from Khurshudov's report shown in Figure 12 of his declaration. (See Hospodor Decl., ¶¶ 101 and Figure 12.) Both Hospodor and Khurshudov incorrectly conclude that the curves are "exhibiting failures rates consistent with β increasing to and possibly surpassing a value of 1." First, Khurshudov testified that he drew his conclusions by simply 'eyeballing' the graph in question, and drawing some lines, but did not do any mathematical analysis of the data. (Ex. 14 [Khurshudov Depo.] at 88:17-90:1, 95:7-96:18, 96:23-97:23, 99:1-9.) Hospodor acknowledged in his deposition, that visual examination of graphs like Figure 12 cannot be used to make conclusions about Beta. (Ex. 11 [Hospodor Depo.], 88:10-96:10.) However, this is exactly what Khurshudov did, and Hospodor adopts Khurshudov's unfounded, 'eyeball' opinions even though he acknowledges that Khurshudov's approach is unsound.[21] (*Ibid*.) Moreover, all of the curves in this plot are consistent with Beta < 1. In fact, ***the graph at issue shows that Beta and/or the characteristic life (scale parameter Eta) are decreasing for the cumulative return data plotted***. For example, Figure 4 below shows a constant Beta and a ***decreasing Eta***.

[21] Even Khurshudov noted on the slide at issue that more complete data analysis is needed to confirm his observation, yet Hospodor accepted the observation (which is methodologically unsound) without any further data analysis.

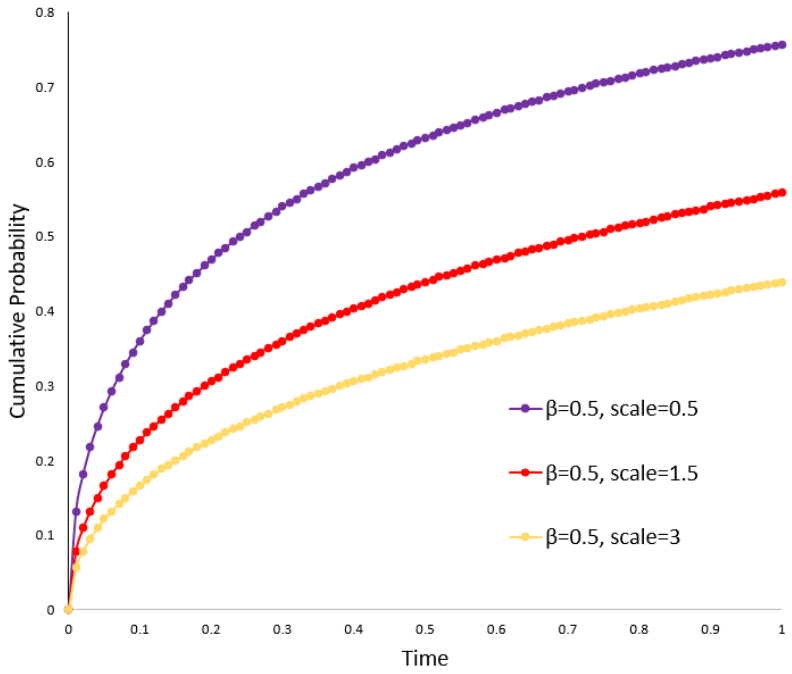


Figure 4. Shape parameter (β) held constant at 0.5; scale parameter (η) decreasing from 3 (gold line) to 1.5 (red line) and 0.5 (purple line). (Figure prepared using Excel and Excel's Weibull function.) **(FIGURE 4 SOUGHT TO BE REDACTED)**

d. After adopting Khurshudov's incorrect 'eyeball' claim that Beta showed a "progression" from β<1 to β>1, Hospodor goes on to claim that "the data points of ***the Grenada fall[]in the β>1 range.***" (See Hospodor Decl., ¶¶ 101.) Hospodor makes a conclusion about "the Grenada" drives even though Khurshudov refused to draw any such conclusion because there simply was not enough data about Grenada. (*See* Hospodor Figure 12 ("We should wait until we could make a conclusion about Grenada"); Ex. 14 [Khurshudov Depo.] at 99:25-101:10.) Moreover, as noted, Khurshudov explained that his report showed for consumer drives Beta was always less than 1 and the and the conclusions about Beta greater than 1 and wear out did not apply to desktop drives like Grenada. (Ex. 14 [Khurshudov Depo.] 126:23-129:10.) Hospodor's attempt to stretch Khurshudov's statements to cover Grenada drives lacks any reasonable basis and is not supported by the data.

e. Both Hospodor and Khurshudov repeatedly say that Weibull Beta or shape

values are 'assumed.' As previously discussed, this is simply not the case. (See Section IV.B.) It appears that Khurshudov was not involved in Seagate's actual reliability testing or calculations of AFRs, so this may explain why he made misstatements about how Seagate actually determined Beta and AFR.[22] (See Ex. 14 [Khurshudov Depo.] at 13:24-15:11; 24:16-25:16.; Almgren Decl., ¶ 24.) At any rate, Khurshudov explained in his deposition that Beta and AFR are based on fitting the Weibull distribution to actual test data (Ex. 14 [Khurshudov Depo.] 47:13-49:5.)

f. The emphasis both Hospodor and Khurshudov place on the Weibull shape parameter, Beta, while excluding the characteristic life, Eta, is not correct. At least two parameters are need to make a useful AFR projection, and the Eta parameter is just as important as Beta.

77. In Paragraphs 106 to 108 of his declaration, Hospodor references a suggestion by Khurshudov that "Longer-term reliability tests (~1 Year) might need to be introduced to gain more confidence in reliability projections." ***But Khurshudov testified that this conclusion did not apply to desktop or consumer drives like Grenada***—it only applied to high-workload, enterprise drives (Ex. 14 [Khurshudov Depo.] 126:23-129:10.) Furthermore, it is true that confidence in the projections can be improved this way and more knowledge of eventual wear out behavior and mechanisms can be gained. It is also true that increasing the number of test samples will improve confidence in the projections. However, there is no reason to think this was necessary to adequately test the Grenada drives and Hospodor provides no basis for so thinking. Certainly Khurshudov made no such conclusion. (*Id.; see also* Almgren Decl., ¶ 26.) Hospodor offers no basis for extending Khurshudov's suggestion to consumer, desktop drives like Grenada, and I see none. First, for HDDs designed for enterprise use (data center applications, servers, cloud computing, etc.) both the number of samples and test time is increased in my experience. By contrast, Seagate's RDT and

[22] The only role in which Khurshudov was involved with reliability was a research role from 2006 to May 2008, and that role did not involve analyzing reliability of any specific products. (*Ibid*.) At the time he wrote the report in question he was "senior director, cloud research and analytics" but Glen Almgren reports that—consistent with his title at the time—Khurshudov was not directly involved in RDT or product qualification and would not necessarily have known how Seagate determined Beta and AFR in those contexts. (Almgren Depo., ¶ 24.)

ORT reliability testing protocol for the Grenada drives—1000 HDDs for 1000 hours—has been widely accepted in the industry for drives like the Grenada drives that are intended for desktop computer applications.[23] Even Hospodor acknowledges that test protocols can be shorter than what Seagate used (30 days rather than 6 weeks). (Hospodor Decl., ¶ 34.) Furthermore, as explained, because Seagate tested the drives at maximum workload (and high temperature) for 6 weeks, Seagate subjected the drives to the equivalent of over 3 to 3.8 years of use and wear. This is more than sufficient to obtain data to project reliability characteristics of the drives over the expected useful life of the drives with reasonable accuracy. Other than his wholly incorrect application of the Weibull analysis (Paragraphs 41, 70-76), and his misplaced reliance on, and misapplication of, Khurshudov's incorrect conclusions (Paragraphs 75, 76), ***Hospodor provides no basis for asserting that Seagate's testing of the Grenada drives was insufficient***. Therefore, Hospodor's claims that Seagate's reliability testing was inadequate and that AFR projections were overly optimistic is not supported by his alleged evidence or arguments. Nonetheless Seagate also tested drives for extended periods of time (an additional 3-6 weeks after the normal 6-week test) to confirm that Beta remained below 1, which it did. (Almgren Decl., ¶ 28; Ex. 13 [Almgren Depo.], at 88:5-90:6.)

3. The Grenada BP2 Test Results

78. In paragraphs 112 to 117 Hospodor misinterprets the GrenadaBP2 reliability test results shown in Figure 14 of his Declaration. He incorrectly states "the AFR increased from 1.039% in the first year to 1.951% in the fifth year." The values for the second year (2Yr FR) through fifth year (5Yr FR) are ***cumulative failure probabilities (FR)*** projected by the Weibull CDF using estimated parameters based on the test data. They are consistent with an estimated shape factor, Beta, less than 1. Therefore his conclusions are mistaken.[24] Moreover, this document shows

[23] This test design is a good balance between cost of samples and equipment and schedule. For no failures during the test this demonstrates reliability of 0.998 with 90% confidence using the Binomial distribution. The annualized failure rate (AFR) for a product operated this much in one year would be less than 1%.

[24] That the 2Yr FR to 5Yr FR are cumulative and not "annual" would seem obvious given that the first year value is "AFR" (the "annualized" failure rate), but the subsequent numbers are not labeled "**A**FR" and instead are labeled "FR." In addition, the only way to arrive at any of these values is to use the Beta and Eta parameters to model the data and derive the AFR and FRs. The AFRs and FRs can't be "inconsistent" with the listed Beta, because the listed Beta was used to produce the AFR and FRs.

that when the Grenada BP2 drives were approved for general release as internal, desktop drives (Disty/OEM), the Demo' d first year AFR was 0.90%. Furthermore, the cumulative failure rate (probability) at the 5th year was less than 2%--meaning that even after 5 years of use, based on its RDT test data, Seagate projected that only 2% total of drives would have failed, while 98% would still be operational. This exceeds the goal in the table from the "5-year BIC Service Life Strategic Initiative." (See Figure 3 above.)

D. The Backblaze Blog Posts Do Not Support Hospodor's Conclusions

79. In Paragraph 104, Hospodor references Backblaze blog posts and implies that they support a conclusion that "the ST3000DM001 … were not as robust as the competition."[25] However, the blog posts do not support this conclusion. It is incorrect to conclude that Backblaze compared the Grenada 3TB drives to even a reasonable sample of competitor drives. For example, Backblaze did not use or "test" enough Samsung or Toshiba drives to even make a comparison, and Backblaze also excluded certain 3TB Western Digital drives from its analysis because they performed too ***poorly***. (See https://www.backblaze.com/blog/what-hard-drive-should-i-buy/ ("We don't have enough Toshiba or Samsung drives for good statistical results" and later reporting that Backblaze excluded Western Digital 3TB Green drives because they failed so quickly.)) In fact, Backblaze only used one other brand of 3TB drives in any significant numbers (HGST), while excluding 3 brands (Samsung, Toshiba and Western Digital). One cannot conclude that the Seagate Grenada 3TB drives were less "robust" than "the competition" when Backblaze only used 1 of 4 competitor brands but not the other three.

80. Moreover, Bakcblaze mishandled and misused the drives, and there are other problems with the blog posts. Seagate's witnesses have explained that log data for drives Backblaze claimed had failed showed a high percentage of the drives with No Trouble Found ("NTF") indicating that the drives were working properly and the failure rate was not what Backblaze reported. (Ex. 17 [Rollings Decl.], ¶ 7.) The boxes or "Pods" into which Backblaze inserted the Grenada 3TB drives (the Pod 2.0 design) was highly flawed, and subjected the drives to excessive

[25] Hospodor does not explain how the blog posts are relevant to his discussion of Beta—they are not.

vibration and potential mishandling. (*Id.*, ¶¶ 4, 5, 8, 9.) Backblaze **admitted** that it had subsequently redesigned the Pod 2.0 to reduce vibration, and that this significantly reduced drive failures even over a short period of time. (See https://www.backblaze.com/blog/180tb-of-good-vibrations-storage-pod-3-0/ (stating that changes were made in the transition from the Pod 2.0 design to the Pod 3.0 design to reduce vibration and that even within a few months, these changes resulted in a "***dramatic improvement*** in overall system performance along with lower drive failure rates.") This indicates that the long period of time (several years) that the Grenada 3TB drives were in the high-vibration Pod 2.0 design was likely a substantial factor in any failures Backblaze observed. Backblaze also admits it operated the drives in a commercial, high-workload 24/7 environment—which is very different and much more stressful to the drives than typical consumer desktop use. (See Rollings Decl., ¶ 5)

81. Finally, Backblaze reports that it purchased over 80% of its ST3000DM001 drives ***before*** September 2012, and purchased all of them by the end of 2012. (*See* https://www.backblaze.com/blog/3tb-hard-drive-failure/.) Seagate approved shipments of Grenada BP drives in April and June 2012, and projected Grenada BP production would equal Grenada Classic production around September 2012. (Ex. 4 [FED_SEAG0026751] at p. 26787; Dewey Decl., ¶ 18.) This means that almost all of Backblaze's drives were Grenada Classic drives manufactured in 2011 and 2012. Even if the Backblaze blog posts were credited (they should not be), the posts could not support conclusions about Grenada BP or BP2 drives, or drives manufactured after 2012.

VIII. Hospodor's Remaining Sections and Evidence Do Not Support Any Claims about the AFR of the Drives or Hospodor's Claim that the Drives Were Released Prematurely or Were 'Unstable' and 'Unreliable' (Hospodor's Section IV.I)

82. As explained in the preceding sections, the data and documents Hospodor cites do not support his conclusions that any version of the internal, desktop drives had a higher than 1% AFR, or that any Grenada drives had a "higher than advertised" AFR. In the remainder of his declaration, Hospodor claims that other evidence (related to yield, ECRs, firmware releases, ship holds, etc.) shows that the drives were "unreliable" and were "released prematurely." Importantly, none of the evidence Hospodor cites can support a conclusion that the AFR for any drives was

not evidence that problematic or "unreliable" drives were shipped to consumers. The evidence instead illustrates Seagate's organizational resolve to find and fix issues as they arise.

105. [redacted]

E. Hospodor Does Not Support His Claim that Seagate Documents "Acknowledge" that the Drives Were "Unstable, Unreliable, and Defective" " (Hospodor's Section IV.I.2(f).)

106. [redacted]

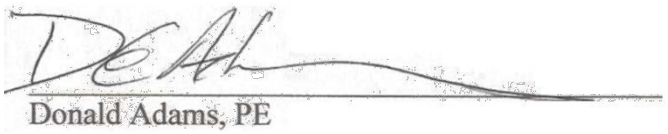
F. A Few Changed Specifications for the Drives Do Not Support Hospodor's Claim that the Drives Were "Unreliable" (Hospodor's Section IV.J)

107. In this section, Hospodor argues that changes in a few of Seagate's specifications for the drive—most at the very end or after the end of the class period (February 2016)—somehow show that there were problems with the drives. The conclusion does not follow from the evidence Hospodor cites. Changes in published specifications are are not evidence that an HDD is unstable or unreliable. Changes frequently occur for many high technology products over time. Spec-sheets

declaration or revise my opinions in light of additional information or documents that may be brought to my attention. I will consider any criticisms of my opinions or bases for my opinions brought to my attention or offered by experts retained by Plaintiffs, which may cause me to revise or supplement my opinions.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on this 5th day of January, 2018, at Pleasanton, California.



Donald Adams, PE

EXHIBIT 26

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE CITY AND COUNTY OF SAN FRANCISCO

TIM POZAR and SCOTT NALICK, Individually and on Behalf of All Others Similarly Situated,

Plaintiffs,

v.

SEAGATE TECHNOLOGY LLC and DOES 1-50,

Defendants.

Case No. CGC-15-547787

DECLARATION OF DAVE ROLLINGS IN SUPPORT OF DEFENDANT SEAGATE'S OPPOSITION TO PLAINTIFFS' MOTION FOR CLASS CERTIFICATION

Judge: Hon. Curtis E.A. Karnow
Date: August 9, 2017
Time: 2:00 p.m.
Dept.: 304

I, Dave Rollings, declare as follows:

1. I have personal knowledge of the facts set forth in this declaration, and, if called as a witness, could and would competently testify to their truth.

2. I have worked at Seagate Technology LLC ("Seagate") since 1988. I have worked as a customer-facing Field Applications Engineer since 1998. In this role, I work with Seagate customers to understand what applications they are using and to advise them on using the proper hard drives ("HDDs") for the application. If customers experience issues with Seagate's HDDs, I troubleshoot those issues by working directly with them. This can involve doing onsite visits with customers, pulling the appropriate logs and information from the customer's HDDs and systems, and delivering these logs and information to Seagate's Design Center for failure analysis. If the customer is interested in the results of failure analysis testing, I am responsible for reporting these results to the customer.

3. It is my understanding that Seagate HDDs with model number ST3000DM001 (the "Drives") are at issue in this action. The Drives were marketed under numerous names, including the Barracuda and the Backup Plus. The Drives are consumer, desktop HDDs that are not designed for use in enterprise applications.

4. I was the Field Applications Engineer responsible for assisting and advising Backblaze Inc. ("Backblaze"). As part of my relationship with Backblaze, I visited Backblaze's corporate headquarters in San Mateo. While I was there, they showed me the Backblaze Pod 2.0 design and I talked to Backblaze about the design. HDDs in the Pod 2.0 design were mounted between guides, with the upper part of the HDDs held in place with rubber bands to prevent the HDDs from banging against the guides in the pod. I advised Backblaze that holding the upper part of the HDDs in place with rubber bands could contribute to HDD failure by coming loose and allowing excessive vibration between the HDDs. I also expressed concern to Backblaze that the Pod 2.0 design would contribute to mishandling of the HDDs.

5. Some of the HDDs installed in the Backblaze Pod 2.0 were the Drives. I advised Backblaze that the Drives were not appropriate for Backblaze's data system, which is an enterprise cloud storage application that runs 24/7. Backblaze employees informed me that Backblaze

employs a cost-driven business model and that Backblaze did not want to incur higher costs by purchasing more expensive enterprise class HDDs.

6. At some point in 2014, Backblaze reported experiencing unusually high failure rates with the Drives. Prior to Backblaze's report, I was not aware of any customer complaints regarding the performance of the Drives or high failure rates associated with the Drives.

7. I obtained logs from the Drives that Backblaze pulled from its system due to alleged failure. The logs showed a high number of "No Trouble Found" ("NTF") results, which indicates an HDD is operating properly. I also obtained physical drives that were pulled from Backblaze's pods due to alleged failure. I performed verification tests on these Drives. I also worked with Seagate's Design Center in performing failure analyses on these Drives. To the extent that Seagate's testing confirmed certain Drives had failed, no one root cause or consistent pattern of failure was identified. Seagate's testing did not reveal any inherent defect in the Drives themselves.

8. I think it is likely that the problems Backblaze reported were primarily due to Backblaze inappropriately using these consumer, desktop Drives in its 24/7, enterprise environment for which the Drives were not designed. Backblaze's Pod 2.0 design, which was subject to excessive drive vibration and drive mishandling, probably also contributed to the failure rate Backblaze reported.

9. Plaintiffs have asserted that Seagate concluded Backblaze's storage pods worked properly and that testing results pointed to issues with the Drives rather than Backblaze's storage pod design. Seagate only tested Backblaze's Pod 3.0 and 4.0 designs. The reports Seagate produced about the Pod 3.0 and 4.0 design are not applicable or transferrable to the Pod 2.0 design because: (1) Backblaze upgraded its pod design and replaced the rubber bands used in the Pod 2.0 design with lids that clamped down on the installed HDDs and were intended to reduce vibration, as Backblaze reported (https://www.backblaze.com/blog/180tb-of-good-vibrations-storage-pod-3-0/), and (2) The ST3000DM001 Drives were installed into Backblaze's Pod 2.0 design, not the Pod 3.0 or 4.0 design.

10. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on this 30 day of June, 2017, at Cupertino, California.

Dave Rollings

EXHIBIT 27

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Attorneys for Defendant SEAGATE TECHNOLOGY LLC

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE CITY AND COUNTY OF SAN FRANCISCO

TIM POZAR and SCOTT NALICK, Individually and on Behalf of All Others Similarly Situated,

Plaintiffs,

v.

SEAGATE TECHNOLOGY LLC and DOES 1-50,

Defendants.

Case No. CGC-15-547787

DECLARATION OF SEK NAM "ALLEN" NG IN SUPPORT OF DEFENDANT SEAGATE'S OPPOSITION TO PLAINTIFFS' MOTION FOR CLASS CERTIFICATION

Judge: Hon. Curtis E.A. Karnow
Date: August 9, 2017
Time: 2:00 p.m.
Dept.: 304

I, Sek Nam "Allen" Ng, declare as follows:

1. I am the Director of Customer Technical Support for the Americas Channel and Original Equipment Manufacturers ("OEMs") at Seagate Technology LLC ("Seagate"). I graduated from the University of Kansas with a Bachelor of Science in Electrical Engineering in 1999. I have held engineering positions at various computer and hard drive companies continuously since obtaining my degree.

2. I have personal knowledge of the facts set forth in this declaration, and, if called as a witness, could and would competently testify to their truth.

3. It is my understanding that Seagate hard drives ("HDDs", "drives," or "hard drives") with model number ST3000DM001 are at issue in this action. Seagate sold these HDDs in various products, including the Barracuda and Backup Plus.

HDDs Are Complex Electromechanical Devices That Can Fail For Various Reasons

4. HDDs with the ST3000DM001 model number were used in many different applications and environments both by Seagate and by consumers and end users. For example, Seagate sold drives with the ST3000DM001 model number as "bare" drives that could be installed by consumers into desktop computers or into external storage systems such as "network attached storage" or "NAS" devices. Consumers could install "bare" drives into desktop computers that they built themselves or into desktop computers or home servers built by computer manufacturers such as Dell, HP, Lenovo, or others. These computers could be configured in a variety of ways and may have differences in other components (e.g. video cards, motherboards, cooling systems) as well. Similarly, consumers could install "bare" drives into NAS systems they assembled themselves or into NAS boxes built by numerous different manufacturers. Typically, NAS boxes might be connected to one or more computers or hand-held devices in a home and used as centralized storage or backup for all of the connected computers or devices.

5. In computers or NAS systems that use more than one HDD, the drives might be used slightly differently than they are used in computers or NAS boxes with only one drive. For example, in systems where several drives are used together, they might be configured as a Redundant Array of Independent Disks ("RAID"). RAID is a storage technology that combines

multiple HDDs into one logical unit to improve performance and/or provide data redundancy for reliability. There are several ways, called Levels, to organize data across the HDDs to achieve a prescribed balance of improved performance and reliability.

6. Seagate also sold drives with model number ST3000DM001 as part of external storage systems manufactured by Seagate. For example, Seagate sold ST3000DM001 drives as part of Seagate's Backup Plus external backup drives. These were single drives housed in their own casing that communicated with a computer by USB cable, which is the most common means of connecting backup hard drive products to computer systems. Seagate also sold drives with model number ST3000DM001 as part of the FreeAgent GoFlex product.

7. The amount and pattern of use the ST3000DM001 drives received could vary widely in all of the above products and environments.

8. HDDs can be affected by the following more general sources of mechanical problems:

i. Contamination – Contamination is a non-specific term that can refer to any particles that may be introduced into the Hard Disk Assembly ("HDA") by assembled components, during the assembly process, from the tools used in assembling the HDA, or as it ages. The latter can result from Outgassing and Wear over the life of the HDD. Contamination can also refer to lubricant that is normally present on the surface of the disks (on the media) accumulating in the wrong place within a hard drive. For example, if the drive is in a high vibration environment, or if the drive is bumped or experiences a mechanical shock, this may cause the read-write head to dip closer to the media and pick up lubrication or "contamination."

ii. Outgassing – Outgassing is the release of volatile materials from the components, adhesives, and lubricants in the HDA as a gas. These can condense on other components in the HDA if not first trapped in its (activated carbon) recirculation filter. This can lead to failures if they condense on the Heads or Disks for multiple reasons of which a few are: a) increase Head to Disk separation (flying height), b) Head corrosion , c) unstable Head to Disk air-bearing, d) Head crash, or e) Disk corrosion leading to grown defects. Temperature is a key

driver of outgassing, and drives that users run in high temperature environments may exhibit higher problems with outgassing.

iii. Wear – Wear is the result of friction between components in contact. This can create contamination as well as just consuming the useful life of the HDD. An important source of wear in the HDA is between the load/unload ramp and the load beam for the Heads when the heads are parked off the Disk. Other sources of wear are the Fluid Dynamic Bearing ("FDB") in the spindle and the pivot bearing on the Actuator Arm. The wear products can lead to failures if they accumulate on the Heads or Disks for multiple reasons of which a few are: a) Head to Disk interference that creates grown defects (and more wear products), b) Head crash, c) increase Head to Disk separation (flying height), or d) Head position tracking errors.

iv. "Random" component failures – Because no components or mechanical systems are ever perfect, a small proportion of each of the components used within hard drives will fail, either because of defects in the components or because of wear over time—leading to some fraction of HDDs failing. Put another way, in any given population of HDDs, some proportion will eventually fail, but the failing drives might have failed for many ***different*** reasons and causes.

9. Furthermore, the ST3000DM001 drives could have been exposed to any of the following intervening, ***external*** factors that could cause them to fail:

i. Vibration – As explained above, HDDs are complex assemblies of many parts that need to move very precisely at very high speeds. The HDDs generate rich emitted vibration frequency patterns because of their high spindle speed, spindle imbalances, rapid actuator access times, and HDD system resonant modes. Accordingly they should be adequately secured in the computer case, NAS box, or other environment in which they are used so that these vibrations are suppressed. This is even more important when many HDDs are used together because, if not properly done, the emitted vibrations will be transmitted to neighboring HDDs. These vibrations can combine constructively and be amplified by chassis resonances. This can lead to failures for multiple reasons of which a few are: a) grown defects due to undetected positioning errors while writing, b) Head to Disk interference that creates grown

defects from contamination of undetected excitation of air-bearing resonances, c) high-fly write events that created grown defects, d) Head crashes, e) unstable Head loading (LUL cycles) that create debris leading to a, b, c or d above, f) system time-out error events or slow performance since the HDD cannot position its Heads accurately (HDD does not respond).

ii. Controller Card – In certain systems, HDDs are often used in conjunction with a controller card that allows HDDs to communicate with each other and with the host computer. Changes to the firmware on the controller card can cause HDDs in the system to malfunction.

iii. Cables – HDDs must be connected to a power source and the controller card or computer motherboard by cables. If the cable used to connect an HDD to a computer is defective, this may cause connection issues, read or write failures, or otherwise cause the HDD to malfunction.

iv. System Upgrades/Updates – Apple and Microsoft constantly provide customers with computer software updates or upgrades. Apple iOS and Windows updates can cause external HDDs, such as the Backup Plus, to fail as a result of incompatibilities between the updated operating system and the device firmware interacting with the operating system.

v. Consumer or Shipper Mishandling – Any mishandling of an HDD by end users or by mail carrier services can cause HDDs to fail. Such mishandling includes dropping items on the HDD, dropping the HDD on hard surfaces, spilling liquids on the HDD, and exposing the HDD to higher or lower temperatures than the temperatures it is designed to withstand.

10. Based on my extensive professional experience with HDDs, it is my understanding that many types of mechanical failure cannot be diagnosed without physically testing and analyzing the drives.

Apple Recall of ST3000DM001 Drives

11. In June 2015, Apple issued a recall of ST3000DM001. I am aware of the Apple recall because the Customer Technical Support department is the division within Seagate responsible for managing Apple's account with Seagate. Apple reported to Seagate that it was seeing a cumulative return rate of around 5% or 6% on drives manufactured approximately two

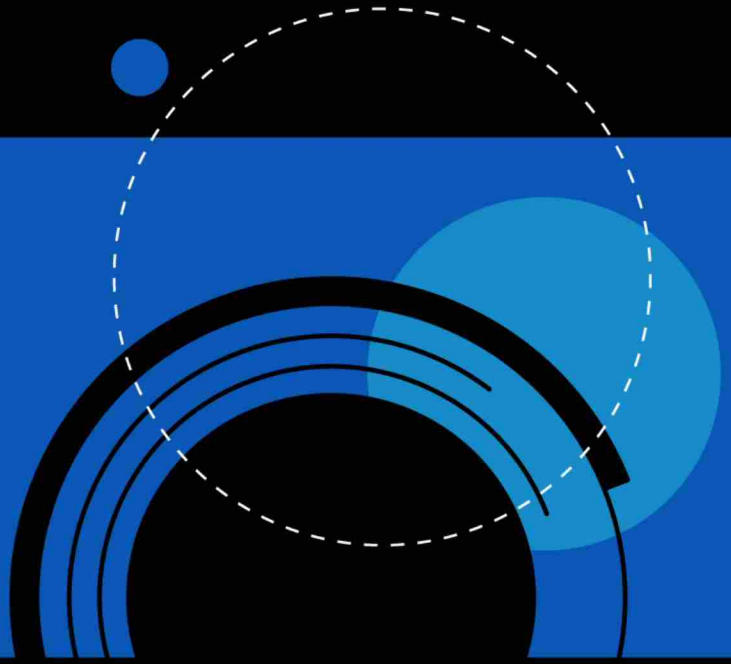
and one-half years earlier. If true, this would indicate an annual return rate of less than 3%. Even though other Original Equipment Manufacturers ("OEMs") also sold the ST3000DM001 drives in their computers, I am not aware of any other OEMs that were dissatisfied with the 3TB Drives or that issued a recall.

I declare under penalty of perjury under the laws of California that the foregoing is true and correct.

Executed on this 30th day of June, 2017, at Cupertino, California.

Sek Nam "Allen" Ng

EXHIBIT 28



RHO Quality Update PSG/NSG

Robert LaBore

November 29th 2013

Seagate

Grenada BP ORT (Disty) – Q214

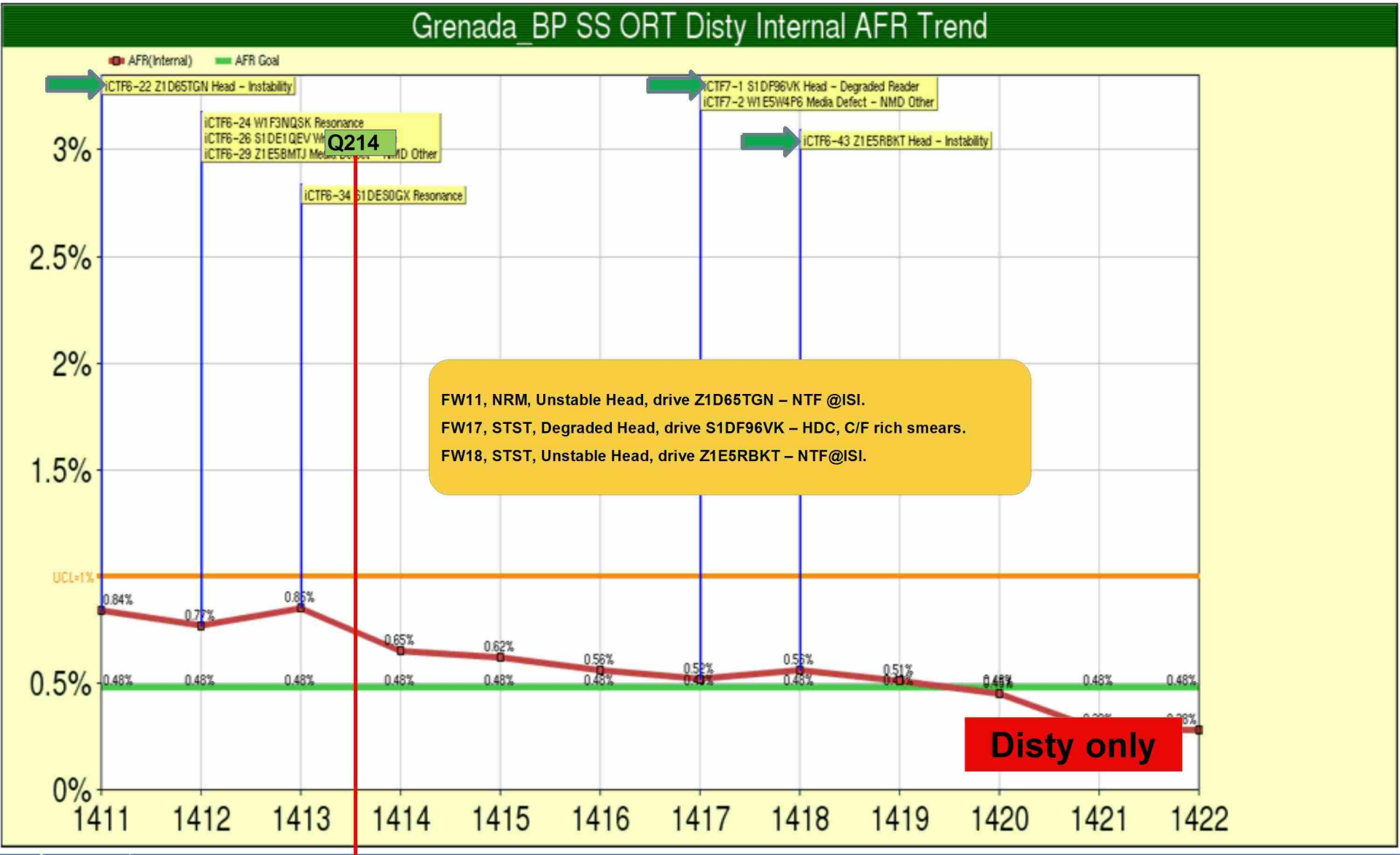


EXHIBIT 29

Release Products ORT Review

RPT: Sean Buckman, Patrick Sullivan LCO team

February 19, 2014 ww34

Seagate

GrenadaBP OEM

Key Items

OEM AFR 0.59%

- ww34 added 1x Head instability 1x head Asymmetry added for ww33 since last report
- Slider-level bar-bake approved to help instability , 100% cut in by ww30
- Bad write loss of HF content fail mode is currently being looked at LCO Team is trying to repeat, then check to see if write pre-comp change could help this fail mode. Could also be HMS margin issue or contamination related.

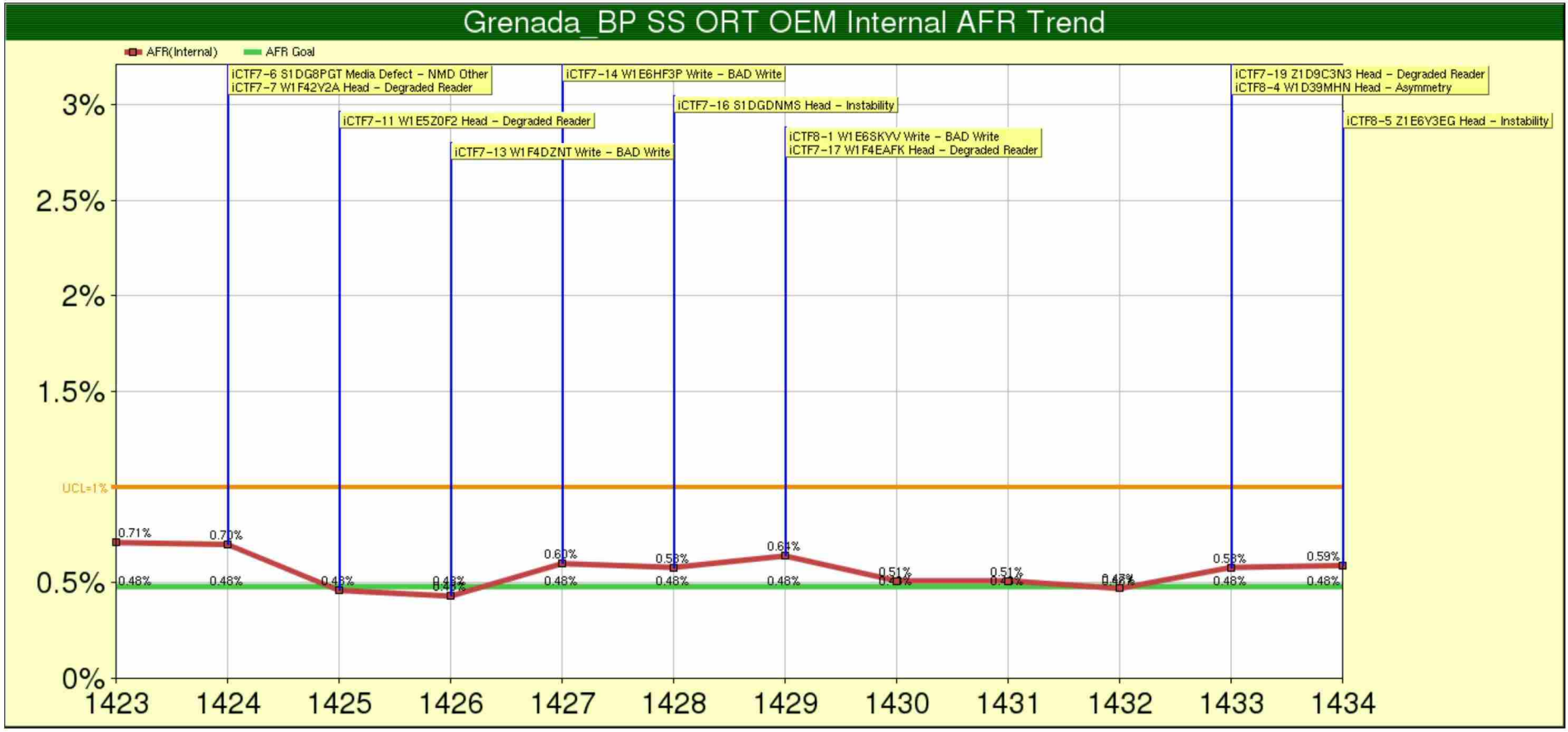
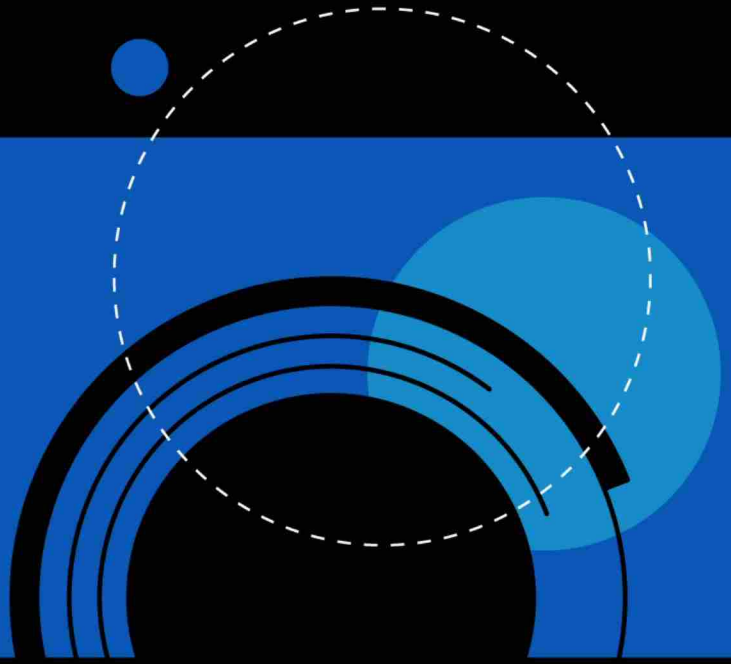


EXHIBIT 30



RHO Quality Update DT/NB/CS & NL

Robert LaBore

July 4th 2014

Seagate

GrenadaBP1 ORT (OEM / Disty) – Q115